



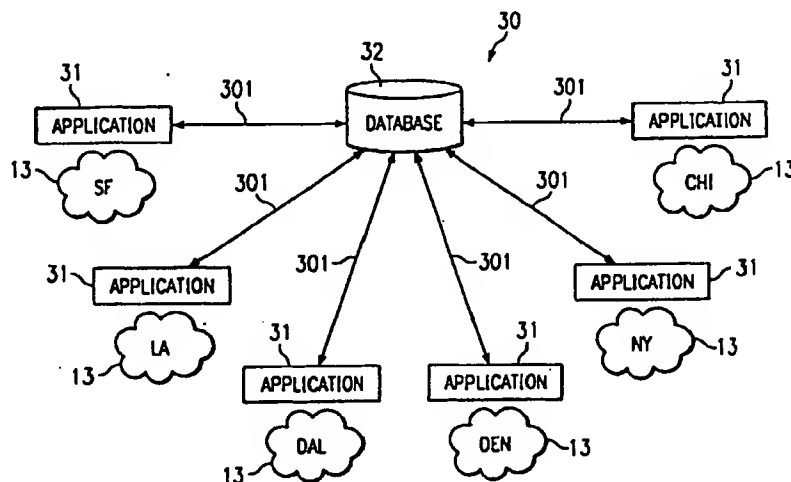
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(54) Title: **GEOGRAPHICALLY DISTRIBUTED MULTIPLE APPLICATION NETWORK HAVING A CENTRAL DATABASE**



(57) Abstract

Processors capable of providing multiple telecommunications services are distributed to a number of remote locations. Each local processor provides service to callers in a certain geographic area. All of the processors are connected to a single central database which maintains application data and customer information. Each processor comprises a telecommunications switch for connecting callers to called parties. The remote processors identify the telecommunications services desired by incoming callers using automatic number identification (ANI), dial number information service (DNIS) or information input by users. Each processor is capable of providing one or more of the following services: prepaid calling, voice mail, automatic call director, interactive voice response, automated customer service, and international call back.

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**GEOGRAPHICALLY DISTRIBUTED MULTIPLE APPLICATION NETWORK
HAVING A CENTRAL DATABASE**

TECHNICAL FIELD

The present invention relates to telecommunications systems and, more particularly, to a system in which remote devices provide multiple telecommunications applications using a single central database.

BACKGROUND

Prior art telecommunications systems are typically configured so that a particular service is provided to customers by a single central processor or switch. As a result, all customers must access the central processor in order to use the service or application. For example, in a prior art prepaid calling application, users must first dial a number for the central processor in order to access the prepaid calling system. Once connected to the central processor, the customer identifies a particular prepaid account to be charged for the cost of the call. A database connected to the central processor holds account information for all customers. The central processor routes the customer's call and monitors the running cost of the connection. Finally, the processor updates the customer's prepaid account balance in the central database when the call has been completed. In this type of configuration, the central processor creates a single point of failure. If the central processor fails, then the entire system fails and no customers can access the prepaid calling application.

Another limitation of prior art telecommunications systems is that they typically provide only one application or service. For example, the central processor may offer only a prepaid calling service to customers. Another device must be used to provide other services, such as voice mail or customer service applications. As a result, the service provider must provide separate equipment and telephone line connections for different applications.

In some cases, instead of a single central processor, a service provider may use several individual processors in different locations. Each processor is capable of providing the same service or application to customers. However, a problem with this prior art arrangement is the need for database equalization across the system. Whenever a customer, such as prepaid calling customer, uses the system, his or her account balance must be updated in every database in the system. As a result, a large volume of database equalization traffic is required in the system. In a prepaid calling system, each access that changes the user's account balance requires the system to make a number of transmissions to the other system databases to update the other copies of the user's records. As the number of local processors or databases increases, the number of required equalization transmissions also increases.

SUMMARY OF THE INVENTION

The problems of the prior art are overcome by a system in which a plurality of remote processors at various locations are connected to a central database. The remote processors provide multiple telecommunications services to callers. Each processor is linked to the central database which holds application data and customer information. The central database is preferably a RAID database having a low failure rate.

Callers are connected to a local processor that provides a number of telecommunications services, such as prepaid calling, voice mail and customer service applications. A single local processor may be connected to multiple trunk lines to handle a high call volume. Automatic number identification (ANI) or dialed number information service (DNIS) data may be used by the remote processors to identify the services required by a particular customer. The remote processors are preferably capable of handling dual tone multifrequency (DTMF), facsimile, and data transmissions in addition to voice communications.

The database provides a central location for customer records and information so that only one file must be updated for each change to a customer's profile. For example, in a prepaid calling application, after the customer has completed a prepaid call and disconnected from the service, the central database is updated to reflect the customer's current prepaid account balance. The use of a single central database also provides fraud detection capability, since the system can instantaneously detect if two users are attempting to use the same account at the same time.

It is an object of the present invention to provide a system in which a number of telecommunications applications located in remote locations are capable of accessing a single central database. Multiple application systems are deployed in a number of remote locations and each remote system is connected to a central database which stores user information and data related to the applications.

It is another object of the present invention to provide a central database which is capable of communicating with a number of remote systems. The database stores user information and data related to one or more telecommunications applications. The remote systems are operable to notify the central database of modifications, changes and updates to

the stored user information and application data. Multiple storage disks, mirroring and other techniques can be used to lower the fault rate of the central database.

It is an additional object of the present invention to provide a multiple location, multiple application telecommunications system in which users can communicate using voice, DTMF, facsimile, or data communications. Remote location processors operate to detect the
5 format of incoming communications and route calls to applications that are capable of handling a particular communications format.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described
10 hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and the specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that
15 such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawing, in which:

5 FIGURE 1 is a block diagram of one embodiment of a widely distributed telecommunications network;

 FIGURE 2 is a block diagram of another embodiment of a widely distributed telecommunications network;

 FIGURE 3 is a block diagram of the claimed telecommunications system;

10 FIGURE 4 is a block diagram of the components of a system that is deployed at remote locations in the present invention; and

 FIGURE 5 is a diagram of a preferred embodiment of the system shown in claim 4.

DETAILED DESCRIPTION

System 10 in FIGURE 1 is a geographically distributed telecommunications system having a single central application processor 11. This application may be related to any of a number of well-known telecommunications services, such as prepaid or debit card calling, prepaid wireless calling, voice mail, automated customer service, automated service activation, or international call back. Users in various cities 13 access application processor 11 via lines 101. Application data and user information is stored in database 12. In system 10, users can initiate calls from any remote location 13, such as from any city or country, and, no matter where the call is originated, users will always be connected to the same application 11 and the same database 12.

A problem with the configuration in system 10 is the cost of connecting all users to one centralized application processor 11. Since the users may be widely distributed through various remote locations 13, the majority of users will probably be connected to application 11 via a costly long distance telephone or data connection. Furthermore, since there is only one application processor 11, system 10 will have to be designed to handle a large call volume. This will present a switching problem since all users must be connected to the same application 11. As a result, application processor 11 and database 12 represent a single point of failure for system 10. If application processor 11 or database 12 are inoperative, all users in all locations 13 will be unable to use the system.

System 20, shown in FIGURE 2, illustrates another embodiment of a widely distributed telecommunications system. Application processors 21 and databases 22 are deployed at each remote location 13. Each remote application processor 21 has identical capabilities. This allows system 20 to connect users in each remote location 13 to a local application processor 21. Accordingly, system 20 reduces the call transport costs and the switching problems of system 10. However, multiple databases 22 in system 20 introduce a different problem. In order for each application 21 to perform the same way, each database 22 must contain the same application data. Also, if each user is going to be able to use system 20 from any remote location 13, then each database 22 must have the same user information. Accordingly, system 20 must continually equalize the application data and customer information that is stored at each location 13.

In order to maintain the same data and information among all databases 22, lines 201 interconnect each database 22 and allow databases 22 to exchange updated user information and application data within system 20. This arrangement shifts some of the traffic load from user connection lines 101 in system 10 to data connection lines 201 in system 20. For most applications, each time a user accesses system 20, his or her database profile must be retrieved by local application processor 21. Furthermore, after the user has disconnected from system 20, typically his or her user information or account records will have changed. For example, in a prepaid calling application, local application processor 21 must access each user's account information to verify prepaid balances and password information. After each user access, the accessed local database 22 must transmit updated account information, such as the current prepaid balance, to the other databases 22 via links 201. Also, each time a new version or revision of application 21 is introduced, the application data files in databases 22 must be updated.

With respect to user information, in many types of applications updated information must be distributed in a timely fashion in order to prevent fraud. In the prepaid calling application example, if a user in New York accessed the system 20 to make a prepaid or debit card call, then, upon completion of the call, the user's current account balance would be accurate in New York database 22. However, until they receive updated information, all other databases 22 at other locations 13 will have incorrect user information. Therefore, if the user depletes his or her prepaid account balance and if the updated account information is not distributed to the other remote databases 22, then someone at another location 13, such as Dallas, could access the prepaid calling system and charge calls to the incorrect account balance shown in the user's record on Dallas database 22.

Another problem in system 20 is the number of links 201 that are required. Each local database 22 must be capable of accessing and updating all of the other local databases 22. Each time a local user record changes, a number of communication connections must be made to update all of the user's records in system 20. This would require many long distance connections as the result of a single local connection between a user and a local application 21.

A third embodiment of a widely distributed telecommunications system 30 is shown in FIGURE 3. In system 30 each remote location 13 has a local application processor 31. As a

result, the connection costs associated with system 10 are reduced since the users are not connected to a central application, such as application processor 11, via a long distance telephone connection. In system 30 the costs are lowered because the user connections are local instead of long distance.

5 Central database 32 is used to maintain application data and user information for the entire system. Each remote application 31 is linked to central database 32 via connection 301. This reduces the number of database connections 201 that are required in the configuration of system 20. Central database 32 also eliminates the need to maintain multiple copies of the same records in many locations. Instead, each local application 31 can access database 32 to
10 verify or update user information. Also, the data used by remote application processor 31, such as software, program instructions, reference tables or lists, can be easily updated in one location at one time.

FIGURE 4 illustrates local system 40 which is deployed at each location 13 in a preferred embodiment of application 31. Remote system 40 communicates with central
15 database 32 via connections 301, which may be any well-known communication link that is capable of transporting data from one location to another, such as a wide area network (WAN), Internet, cable, or dedicated telephone line connection. Users 401 access local system 40 via public switched telephone network (PSTN) 402. System 40 comprises a plurality of individual application processors 403. Each processor 403 provides a separate
20 telecommunications service, such as prepaid or debit card calling, voice mail, automated call director, interactive voice response, automated customer service or international callback. Depending upon the specific service or function, system 40 can support various communications formats between user 401 and applications 403, for example, application processors 403 may be capable of transmitting and/or receiving voice, dual tone multiple
25 frequency (DTMF), facsimile or data communications.

Controller 404 provides an interface between application processors 403 and central database 32. In some applications, switch 406 is used by processors 403 to route caller 401 to called party 410 through PSTN 409. Additional system connections at telephone handset 407 and computer terminal 408 provide access to a system administrator for maintenance, repairs
30 or upgrades to system 40. Alternatively, in certain applications 403 caller 401 is routed to a service representative, agent or operator at terminal 408 or telephone 407.

System 40 is capable of simultaneously providing a number of calling services to many incoming callers 401. Some individual application processors 403 may be dedicated to a particular service application. Other application processor 403 may be a generic platform that can be configured as needed based upon caller demand levels. When caller 401 is routed
5 to such a generic application processor 403, the processor downloads from central database 32 specific instructions or software for that application.

System 40 may be connected to a trunk line that carries a number of incoming callers 401, wherein each caller 401 desires a different application. One method of determining an inbound caller's desired application is to use dialed number information service (DNIS) in
10 which system 40 receives information specifying the telephone number actually dialed by caller 401. Using the DNIS information, system 40 can route caller 401 to an application 403 that corresponds to the called number. DNIS information is useful in routing calls that are received via a trunk line which may be carrying many calls for different numbers. For example, a service provider may use several "800" numbers, each for a different application or
15 service. Calls to any of these "800" numbers are all routed to the same system 40, which sorts the calls to the proper applications and processors 403 according to the DNIS information.

Another method for routing inbound calls uses automatic number identification (ANI) or caller ID (CID) information. System 40 can use ANI or CID information to identify calling party 401, or the number from which the inbound call originates, and then routes the call to an
20 application which is correlated to the identified calling party or calling number. For example, system 40 may use different variations of a particular application for different parts of the country. Accordingly, using ANI information, system 40 will route the caller to a processor 403 having the desired customer format.

In other embodiments one number may be used by caller 401 for all applications or
25 services, and system 40 sorts the calls using an interactive voice response (IVR) or menu system. Alternatively, system 40 can be adapted to identify various communications formats that may be used by caller 401. For example, system 40 may recognize speech, DTMF inputs, facsimile or modem handshake tones, or data transmissions. Then, system 40 will route the call to a specific application processor 403 that is configured to interact with the
30 communication format detected. A system that is capable of detecting various communication formats is disclosed in pending application serial number 08/720,559, entitled SYSTEM AND

METHOD FOR IDENTIFYING REMOTE COMMUNICATIONS FORMATS, commonly assigned to the same entity as the present invention, the disclosure of which is hereby incorporated by reference herein.

In some telecommunications applications, inbound callers are routed to another party. For example, in prepaid or debit card calling applications, caller 401 uses system 40 to route a call to party 410. Caller 401 is assigned to an appropriate application processor 403, which then retrieves user information and application data from central database 32. The call is then routed via network 409 to called party 410 through switch 406. It will be understood that in various embodiments networks PSTN 402 and 409 may be a wireline or wireless network and caller 401 and party 410 may use a telephone handset, mobile telephone, wireless device or facsimile machine. Alternatively, system 40 may route electronic mail or other data transmissions from one device to another.

In another type of application, such as in an IVR system, caller 401 is connected to an application 403 which provides certain requested information. For example, a bank may use system 40 to provide an account balance, interest rate, or other financial information in response to menu prompts selected by caller 401. Database 32 may be used to hold such customer and bank information in addition to application data.

An additional type of application, such as a customer service application, connects caller 401 to an agent, service representative or operator at stations 407 and/or 408. A business may provide a number of agents or service representatives who are available to communicate with customers, for example via telephone 407 or terminal 408. Application processor 403 routes caller 401 to the agents at 407 or 408. The application may select a particular agent station 407, 408 depending on certain criteria, such as a product, service, or language identified by caller 401.

Tuning now to FIGURE 5, a preferred embodiment of the present invention is shown as system 50. System 50 is highly scaleable with the capability of providing thousands of ports for handling inbound and outbound calls. The preferred system 50 supports basic functions required by a network service node (SN) as well as enhanced functions and services required by an intelligent peripheral (IP), with the flexibility to meet any signaling and telephony interface needs. A prior art system which uses a service control point (SCP), SN, or

IP to manage calling services is disclosed in U.S. Patent No. 5,703,940, issued December 30, 1997, and entitled METHOD AND APPARATUS FOR DELIVERING CALLING SERVICES, the disclosure of which is hereby incorporated by reference herein.

5 Telephony resource modules (TRM) 57 function as an external network interface for telephony connectivity. TRMs 57 run telecommunications applications and associated services, such as DTMF and voice related interaction with users. TRM 57 consists of a processor, video card, ethernet card and controller card. A number of TRMs 57 can be cooperatively combined in network services platforms 51 and 52. Individual platforms 51 and 52 can then be clustered through the use of networking technologies to form large systems. In
10 one configuration, a number of TRMs 57 are combined to provide 2,112 total ports in system 50. Inbound and outbound calls are bridged together in system 50 to form a completed call. For example, 1,920 of the ports may be used to support 960 call sessions and the remaining 192 ports can provide redundancy. However, there is no theoretical maximum on either the number of ports in a clustered system, or the number of applications running on platforms 51,
15 52.

 Each platform 51, 52 includes an administration processor 58 which provides system operations personnel access to the maintenance and administration services of platforms 51 and 52. Administration processor 58 communicates with each of the TRMs 57 via an integrated LAN. Maintenance navigation tools which collect information from each TRM 57
20 are provided on administration processor 58.

 SS7 server 59, such as a SUN ULTRA2, is supplied to support the SS7 services required for TRMs 57 on platforms 51 and 52. Server 59 connects to the SS7 links via E1, T1, V.35, or RS-449 protocols. Platforms 51 and 52 are connected to switch 53 via lines 501 and 502 which may be dedicated T1 voice lines or SS7 links. Switch 53 handles both
25 incoming calls from users and outgoing calls to called parties. Within platforms 51 and 52, server 59 is connected to TRMs 57 with an internal LAN.

 The central database of system 50 consists of a redundant pair of servers 55, such as HP9000 Series Model K410 servers complete with three 120 MHz processors 1Gb RAM, and HP-UX operating system. Servers 55 are configured in a high availability configuration with
30 concurrent access. Both servers 55 interface to database 54, which comprises dual RAID 1

mirrored data storage units, such as dual HP model-20 64 Gb RAID-1 disk arrays, in a preferred embodiment. RAID units 54 serve as the central storage entity for application data and user information. Both servers 55 share the call load, however, one server 55 can provide database access for the full call load in the event that the other server fails. Servers 55 are
5 connected to platforms 51 and 52 by network 503. Network 503 may be a wide area network (WAN), which allows servers 55 and database 54 to be located remote from platforms 51 and 52. Alternatively, network 503 may be a local area network (LAN) or any other appropriate data transmission network.

Terminal 56 represents an operator, customer service or system administrator position
10 that is connected to servers 55 through separate LAN/WAN 504, which may be a 100 BaseT LAN. Connection 504 provides operators/administrators with access to customer information in database 54. Additionally, terminal 56 may be used to display user information for a current caller to a customer service agent.

System 50 can provide a number of telecommunications services to users. The
15 following summary of features and functionality within a prepaid calling card application is provided as an example of the capabilities of system 50.

Standard Calling

System 50 provides standard, routine call flow from origination through termination. The calling card user places an unassisted call through system 50 using the following
20 sequence:

1. The user dials an access number (typically toll-free access number) and is connected to one or more greeting and/or menu selection announcements or prompts.
2. The user hears a greeting and/or menu selection message.
- 25 3. The user enters an authorization code.
4. The user enters the desired destination number, speed dial code, or another menu selection.

Callers may be directed to particular "Brands" that welcome them to system 50 and can then be offered a number of different enhanced services. These prompts and announcements may

be offered in the language of choice, depending on system configuration and account preferences.

Speed Dial Dialing

5 Users have the ability to set up personalized two-digit speed dial codes. Subscribers have complete flexibility, including the ability to custom-edit their speed dial lists on demand in either an automated session on system 50 or by contacting a Customer Service Representative. For example, to update or change a speed dial entry, a user selects the speed dial editing option within a main menu and is prompted to enter a number between 21 & 99. If the speed dial entry already exists for the user, system 50 will inform him or her of the
10 phone number currently in memory in database 54. System 50 will then direct the caller to select an option for editing: overwrite the existing speed dial, enter a new speed dial, or return to the main menu. When users want to use the speed dials already set up, they simply enter the speed dial when prompted for the destination number. System 50 reserves speed dial numbers 01 - 20 for global speed dials designated by the carrier and typically pre-defined as
15 common customer service, billing, and ordering numbers.

DNIS Based Call Branding

Dialed Number Identification Service (DNIS) is a feature of "800", "888" and "900" lines that provides the number the prepaid user dialed to system 50. After dialing a specific 800/888/900 number the user will hear a branded message prompt such as, "Welcome to the
20 XYZ platform, please enter your card number". The use of DNIS digits directs the system to use XYZ announcements for calls originating from DNIS "XYZ" as opposed to ABC announcements for calls originating from the "ABC" 800/888 DNIS number.

PIN Branding

25 Immediately after the user has entered his or her personal identification number (PIN) and it has been validated, system 50 transmits a message, such as "Thank you for shopping the XYZ store in (any town)."

Post Dial Branding

After a destination number is dialed, system 50 may play a message such as "You have X minutes for this call and thank you for using XYZ" to the caller. This gives the service provider another opportunity to say their name and create brand awareness by simply recording a custom announcement. Post dial branding can be tied to DNIS information, and allows service providers to have welcome and thank you greetings as desired for a given service offering.

Digit Stripping

System 50 has an intelligent number interpreter that will strip any unnecessary digits from destination numbers in order to complete the call. For example, if a subscriber dials 1-NPA-NXX-XXXX as the desired destination, system 50 will drop the "1" prefix prior to sending the call to the public network. This capability is configurable to enable connectivity and signaling in a wide variety of network environments.

Account Information Prompting

In the prepaid calling card main menu, the user can select an option to play his/her account balance. This balance is given in units, such as minutes, or in dollars as appropriate for the service offering.

Low Balance Notification

Low balance thresholds are set for prepaid calling cards to alert the user to time remaining on a call. For example, at 3 minutes, 1 minute, and 30 seconds the user can be provided with a "warning" of imminent disconnect. These thresholds are configurable at three levels within system 50, the agent program, agent, and system level.

Reorigination

Users can place sequential calls without exiting system 50 or having to re-enter their authorization number. Subscribers may use a designated key, such as the pound key (#), to drop the current call and enter a new destination. Or, after the called party disconnects, the subscriber may be prompted to either enter a new destination number or press a key, such as the star (*) key, for access to the main menu.

Busy Reorigination

System 50 prompts a user for a new destination number when it detects a busy signal at the called destination.

Varied Authorization Code Size

System 50 is capable of handling a range of from 7 to 20 authorization digits. The authorization code size is set at the program level and different applications may have different authorization code sizes. System 50 validates within database 54 whether the code matches a valid authorization code. If all validation methods are successful, the user is allowed to access platform 51 or 52.

Standard Minutes Based Rating

This type of rating assigns a monetary value to 1 unit, such as a minute, of calling time. For example: if 1 unit is set to equal \$.35, a 30 unit prepaid card would have 30 minutes of calling time equal to \$10.50. Typically, system 50 will rate to the second decimal. If rating is to be done on a 6-second increment basis, the minute rate is divided by 10. Rounding can be used to increment the last significant decimal digit.

Mileage Based Rating

System 50 can also charge a specific rate for X number of miles, where X is the minimum mileage threshold. Once the call exceeds X miles from its origination, system 50 can charge N cents for each additional mile over X. For example: for any call within 100

miles, the system can be translated to charge a rate of \$0.20 per minute. Once the call is more than 100 miles from origination, the rate can be set to \$0.10 per minute plus an additional N cents per minute for every mile over 100. The point of origination is determined by the ANI received on call origination into system 50, with the destination being determined by area code and exchange. Standard Bellcore V&H tables are used to determine mileage.

Time of Day Rating

A service provider can charge different rates based on the time of day. Rating is based on system platform time and, depending upon the application, may be combined with other rate plans.

10 International Origination/Destination Based Rating

In some applications, the country of origin or the destination country determines the rate structure. Generally, this rating plan only applies to international calls. For example, if a call from the UK to France is placed via a US system, then system 50 rates the first leg (UK to US) based on the origin, and the second leg of the call (US to France) based on the destination. System 50 then adds the two rates together for a per minute rate for the call. Each "leg" of the call can be rated independently.

Holiday Rate Plans

A service provider may offer specific rates corresponding to a specific date or series of dates. For example: "10 cents a minute all day for Mother's Day" or "20 cents a minute from December 25th to January 1st" could be translated per the service offering.

Card Expiration After Fixed Date

A prepaid calling card account on system 50 can be set to expire at a fixed point in time.

Card Expiration After N Days From First Use

Alternatively, a prepaid calling card account can be set to expire N days after first use. For example, if N is set to 60 on a particular card account, that card would expire and become invalid 60 calendar days after the date that the subscriber first used the card on system 50.

5 Card Recharge

Users may be provided with a card that is "rechargeable", wherein the user has the option of adding value to a prepaid card. For example, the user may call a Customer Service Representative, who can then recharge the user's account once credit authorization has been obtained.

10 Velocity Based Fraud Control

System 50 may determine fraudulent use by comparing a "previous" call's ANI, to the "present" call's ANI, and evaluating the normal time and distance between both points using Bellcore V&H tables. For example, assume a subscriber originates a call from New York at a given point in time. If the same authorization code is entered in Los Angeles one hour later,
15 the Los Angeles call can be denied. Bellcore V&H tables are used to determine mileage, with that mileage being used to establish if a maximum distance threshold has been passed in under a minimum time threshold. Thresholds are configurable by the service provider.

Call Restrictions

Restrictions can be set up at the initiation of calling card service. The user tells the
20 service provider to restrict use at the country, area code, exchange, or phone number level. These "scopes" are essentially the range in which a user may make calls. Calling scopes may be set on an "allow" or "deny" basis, thus enabling the service provider to enter the shortest possible list. All values may be modified through a Customer Service Representative. Calling scope can also be changed by the system administrator for a given card product or the
25 entire system.

Bad ANI Detection

An excessive number of invalid accesses into system 50 coming from one ANI (Phone #) automatically inserts that ANI into the Bad ANI Table. When callers dial into system 50 this table is referenced for verification. The service provider sets the attempt threshold on a system-wide basis. The Bad ANI Table can be set to release numbers in a specified period of time, thus, automatically re-enabling calls from a given phone number. However, if the ANI has been in the Bad ANI Table many times (configurable), that ANI may be placed in a "Permanent" Bad ANI Table.

Transaction Processing

A service provider may include a surcharge for certain services, such as a printed historical call record report. These surcharges are typically flat fees set by the service provider.

Balance Transfer

A customer service representative can provide a balance transfer from one prepaid card to another prepaid card. Generally, the cards in question must belong to the same application within system 50.

Call Completion

If a user has trouble completing a call, an agent or operator at terminal 56 may assist and attempt to complete the call while holding the customer on-line. General account information may also be offered to the customer, such as the user's remaining account balance.

Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein

without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A system for providing telecommunications services comprising:
a central database having a database server; and
a plurality of remote platforms coupled to said central database by a data network, each
of said platforms comprising:
5 a plurality of resource modules, each of said resource modules providing a
particular telecommunications application to system users;
control means for controlling said resource modules; and
a telecommunications switch connecting said each remote platform to a
telecommunications network;
10 wherein one or more of said resource modules couple a caller to a called party through
said switch.
2. The system of claim 1 wherein said data network is a wide area network
(WAN).
3. The system of claim 1 wherein said telecommunications network is a wireline
telephone network.
4. The system of claim 1 wherein said telecommunications network is a wireless
network.
5. The system of claim 1 wherein said resource modules provide
telecommunications services selected from the group consisting of:
prepaid calling;
debit card calling;
5 prepaid wireless calling;
voice mail; and
international callback.

6. The system of claim 1 wherein said resource modules provide telecommunications services selected from the group consisting of:

automated customer service;
automated service activation;
5 automated call director; and
interactive voice response.

7. A method of providing telecommunications services to customers comprising the steps of:

receiving inbound calls from said customers, wherein said inbound calls are received by remote platforms serving said customers locations;

5 assigning said received inbound calls to selected ones of a plurality of resource modules in said remote platforms;

requesting data from a central database coupled to each of said remote platforms;

transmitting said requested data from said central database to a requesting one of said remote platforms;

10 using said requested data to provide telecommunications services to said customers;
and

notifying said central database when said requested data has been modified.

8. The method of claim 7 wherein said requested data is customer information.

9. The method of claim 7 wherein said requested data is data related to a specific telecommunications application requested by one of said customers.

10. The method of claim 7 wherein said telecommunications services are selected from the group consisting of:

prepaid calling;
debit card calling;
5 prepaid wireless calling;
voice mail; and

international callback.

11. The method of claim 7 wherein said telecommunications services are selected from the group consisting of:

5 automated customer service;
automated service activation;
automated call director; and
interactive voice response.

12. The method of claim 7 further comprising the step of:
connecting said inbound customer calls to called parties identified by said customers,
wherein said connecting step is accomplished by routing said customer calls through
telecommunications switches connected to said remote platforms.

13. The method of claim 7 further comprising the step of:
identifying a selected telecommunications service using dialed number information
service (DNIS).

14. The method of claim 7 further comprising the step of: identifying a
selected telecommunications service using automatic number identification (ANI).

15. A telecommunications platform for providing calling services to customers in a
telecommunications system said platform comprising:

a plurality of resource means for providing telecommunications applications to said
customers;
5 control means for controlling said plurality of resource modules;
means for interfacing between said plurality of resource means and a central database,
said interface means operating to transmit and receive customer information between
individual ones of said resource means and said central database; and
switching means for connecting said customers to other parties under the direction of
10 said resource modules.

16. The platform of claim 15 wherein said platform further comprises a service control point (SCP) in a telecommunications network.

17. The platform of claim 15 wherein said platform further comprises a service node (SN) in a telecommunications network.

18. The platform of claim 15 wherein said platform further comprises an intelligent peripheral (IP) in a telecommunications network.

19. A method for accessing calling services in a telephone network comprising the steps of:

dialing an access telephone number corresponding to one or more calling services;

5 connecting, as a result of said dialing step, to one of a plurality of telecommunications platforms for providing a plurality of calling services to callers in a telephone network;

indicating a desired one of said plurality of calling service thereby causing said telecommunications platform to select one of a plurality of telecommunications platform resource means for connection, wherein said resource means provides said desired calling service;

10 providing caller information to said selected resource means, wherein said caller information is required by said selected resource means to provide said desired calling service; and

15 receiving said desired calling service after said selected resource means obtains database information from a central database, wherein said central database is coupled to each of said plurality of telecommunications platforms.

20. The method of claim 19 wherein a caller's automatic number identification (ANI) data indicates said desired calling service.

21. The method of claim 19 wherein said access telephone number indicates said desired calling service.

22. The method of claim 19 wherein dual tone multiple frequency (DTMF) signals are used to provide said caller information.

23. The method of claim 19 wherein said caller information in said providing step corresponds to call routing information.

24. The method of claim 19 wherein said caller information in said providing step corresponds to a personal identification number (PIN).

25. A system for providing calling services in a telecommunications network comprising:

first and second telecommunications platforms, each said platform comprising:

a plurality of telephone resource modules, each of said resource modules

5 providing a particular calling service to users of said telecommunications network;

an SS7 server for connection to SS7 links on said telecommunications network, said SS7 server coupled to said plurality of telephone resource modules; and

a plurality of ports for call processing;

10 first and second servers, said servers coupled to each other and to said first and second telecommunications platforms via a local area network (LAN);

a database storage device coupled to said first and second servers, said database storage device holding data for said calling services; and

one or more workstation terminals coupled to said servers via a separate data network.

26. The system of claim 25 wherein said database storage device comprises:
dual RAID 1 mirrored data storage units, each of said units comprising at least 64 Gb of storage capacity.

27. The system of claim 26 wherein said database storage device is located remote from said telecommunications platforms.

28. A computer program product having a computer readable medium having computer program logic recorded thereon for providing a plurality of calling services in a telecommunications network, the computer program product comprising:

means for receiving a plurality of incoming calls from said telecommunications
5 network, wherein said calls are received by a telecommunications platform capable of providing said plurality of calling services;

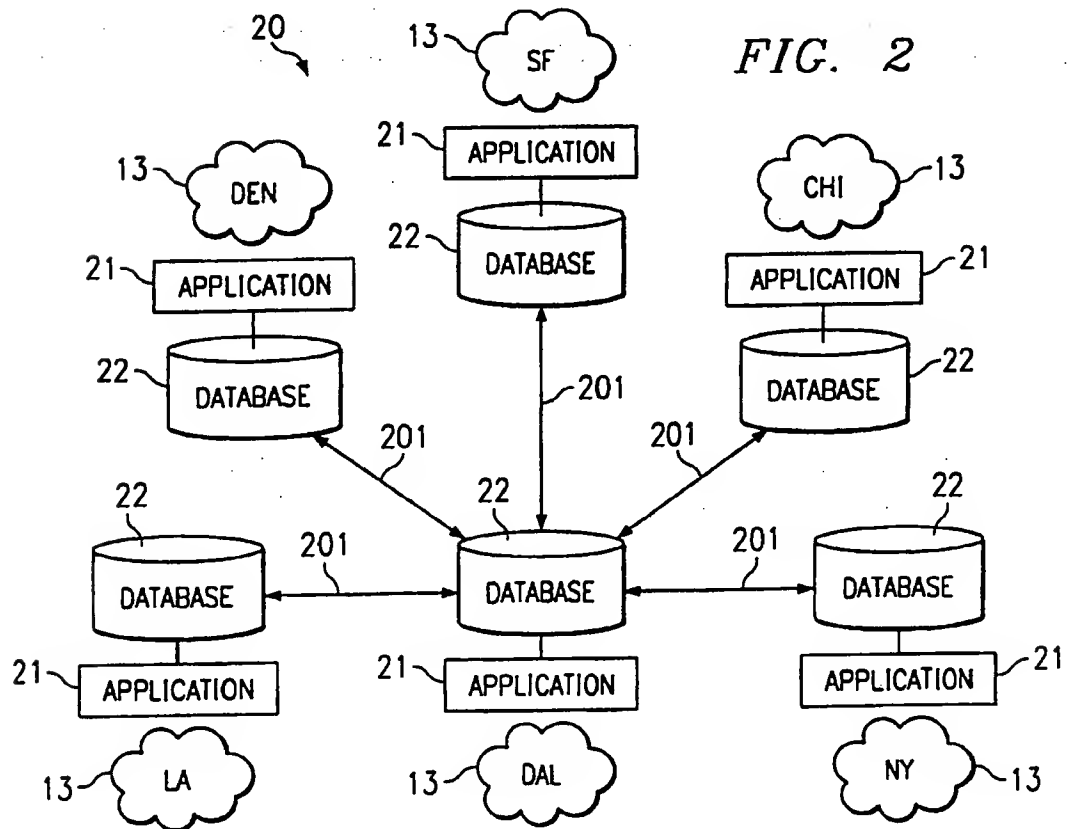
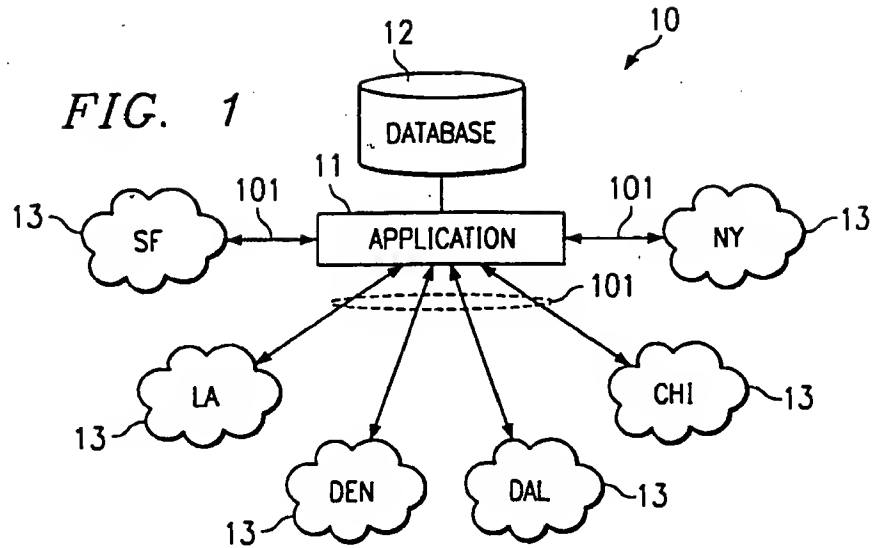
means for identifying a particular calling service desired by each said incoming call;

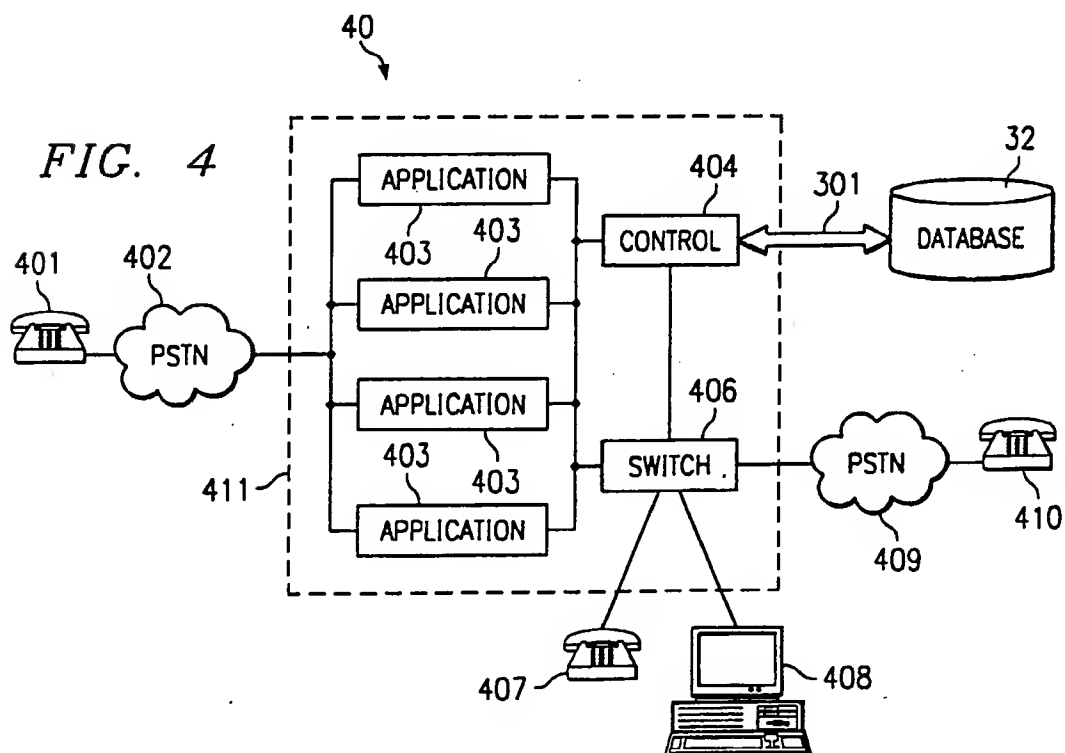
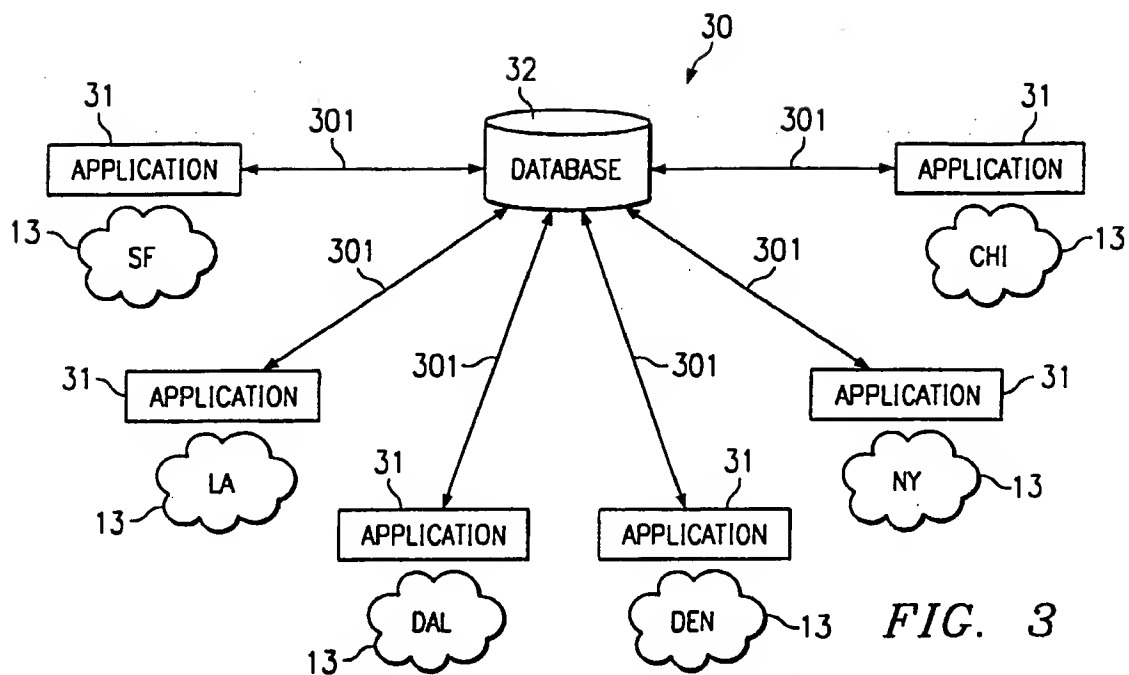
means for selecting a resource on said telecommunications platform, wherein said
selected resource is capable of providing said desired calling service;

10 means for routing each said incoming call to said selected resource; and

means for providing required data to said selected resource from a central database,
wherein said required data is used by said selected resource to provide said desired calling
service.

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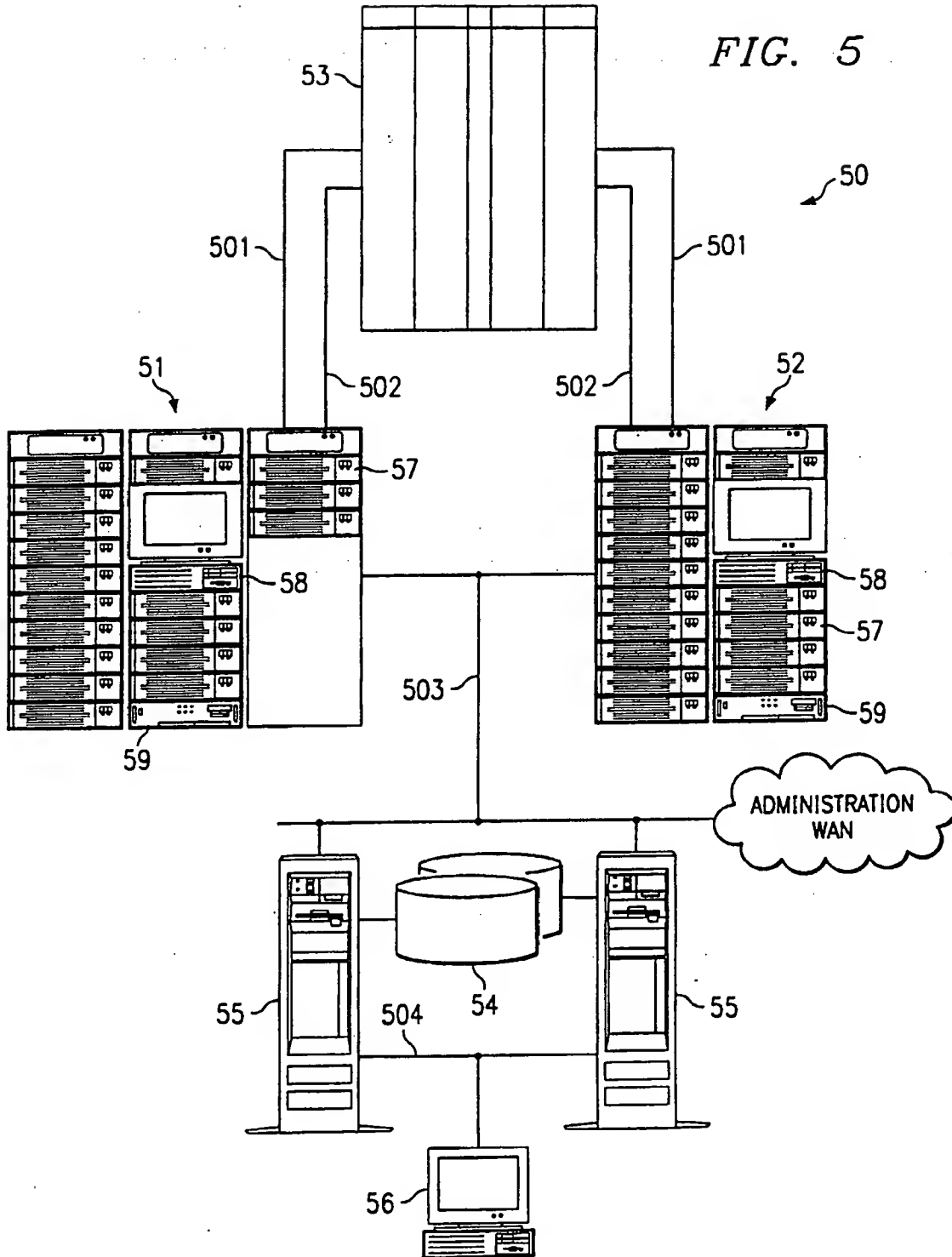




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SWITCH

FIG. 5



INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/US 99/25328

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04M3/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 654 930 A (AT & T CORP) 24 May 1995 (1995-05-24) column 2, line 28 -column 6, line 52	1,3, 5-12,15, 19,22, 25,28
A	EP 0 450 610 A (TEXAS INSTRUMENTS INC) 9 October 1991 (1991-10-09) column 6, line 21 -column 8, line 28	1,7,15, 19,25,28
X	GB 2 198 011 A (AMERICAN TELEPHONE & TELEGRAPH) 2 June 1988 (1988-06-02) page 3, line 29 -page 5, line 23; figure 1	1,7,15, 19,25,28
A	EP 0 451 693 A (TEXAS INSTRUMENTS INC) 16 October 1991 (1991-10-16) --/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"8" document member of the same patent family

Date of the actual completion of the international search

16 February 2000

Date of mailing of the international search report

23/02/2000

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/25328

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 761 290 A (CARMAN JOHN ET AL) 2 June 1998 (1998-06-02)	
A	WO 97 31473 A (BELL COMMUNICATIONS RES) 28 August 1997 (1997-08-28)	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/25328

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0654930 A	24-05-1995	US 5509060 A AU 682401 B AU 7777994 A BR 9404667 A CA 2134485 A,C CN 1111427 A JP 7203032 A NO 944236 A NZ 264943 A SG 44445 A	16-04-1996 02-10-1997 25-05-1995 11-07-1995 20-05-1995 08-11-1995 04-08-1995 22-05-1995 26-05-1997 19-12-1997
EP 0450610 A	09-10-1991	JP 5304567 A	16-11-1993
GB 2198011 A	02-06-1988	US 4899373 A CA 1277791 A JP 1712621 C JP 3079907 B JP 63151156 A	06-02-1990 11-12-1990 27-11-1992 20-12-1991 23-06-1988
EP 0451693 A	16-10-1991	JP 5284221 A	29-10-1993
US 5761290 A	02-06-1998	NONE	
WO 9731473 A	28-08-1997	AU 703123 B AU 5173096 A	18-03-1999 10-09-1997